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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/598,185	04/20/2007	Li Ding	062924	1004

38834 7590 10/01/2009

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EXAMINER	
LOGIE, MICHAEL J	
ART UNIT	**PAPER NUMBER**
2881	
NOTIFICATION DATE	**DELIVERY MODE**
10/01/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentmail@whda.com

Office Action Summary	Application No.	Applicant(s)	
	10/598,185	DING, LI	
	Examiner	Art Unit	
	MICHAEL J. LOGIE	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08/24/2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-7,9,12-19,21-24,26,29-32 and 36* is/are pending in the application.

4a) Of the above claim(s) *3,8,10,11,20,25,27,28 and 33-35* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-7,9,12-19,21-24,26,29-32 and 36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

An "Amendment" was received on 24 August 2009, in response to Office Action of 24 March 2009. Claims 1, 5, 9, 19 and 26 have been amended. Claims 3, 8, 10, 11, 20, 25, 27, 28 and 33-35 haven been cancelled. Claim 36 has been newly added. Claims 1, 2, 4-7, 9, 12-19, 21-24, 26, 29-32, and 36 are pending.

Response to Arguments

Applicant's arguments with respect to claims 1, 2, 4-7, 9, 12-19, 21-24, 26, 29-32, and 36 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 9, 4, 14-17, 19, 21, 26, 31, 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zubarev (US patent no. 6,958,472) and further in view of Ding et al. (US patent no. 7,193,207).

In regards to claims 1, 9, 19 and 26, Zubarev teaches a method/device for dissociating ions in a 3-D quadrupole ion trap (inherent in the apparatus of figure 3) composed of a ring electrode (21) and a pair of end cap electrodes placed across the

ring electrode (cap electrodes 22 and 23), comprising the steps of switching a trapping voltage between two discrete voltage levels to create a digital trapping field for trapping precursor ions and product ions in a trapping region of the ion trap (note; col. 10, lines 32-38, “voltage between the ring electrode 21 and the cap electrodes 22 and 23 is reduced to about 1 to 10 V peak-to-peak. Now the ions are confined in the center of the cell, partially by the electron beam and partially by the alternating voltage, though mostly by the electron beam”, since the oscillating voltage is reduced, it was originally set to a higher discrete voltage and by reducing the voltage peak to peak, the voltage is switched to a second discrete voltage), and injecting electrons through a hole in one of the end cap (fig. 3, note: hole in cap electrode 22 for introducing electrons from the electron source) electrodes into said ion trap while the trapping voltage is at a selected one of said two discrete voltage levels (col. 10, lines 28-38 teach that the electrons are introduced into the trap simultaneously with the voltage reduction) whereby injected electrons reach the trapping region with a kinetic energy suitable for electron induced dissociation to take place (col. 10, lines 14-43 teach the fragmentation, confining ions to the center of the trap with electron capture and col. 4, lines 3-9 and col. 4, lines 24-26 teach an electron beam with low enough energy to provide electron capture by at least a portion of the trapped ions) (regarding introduction of the electron beam through a hole in the ring electrode of claim 9, although it is not expressly taught by Zubarev, such an arrangement (well known to the art at the time the invention was made) is merely rearrangement of parts and the substitution of one known element for another would have yielded predictable results).

Zubarev differs from the claimed invention by not disclosing the two discrete voltage levels to be DC voltages.

Ding et al. teach switching a trapping voltage between two discrete DC voltage levels to create a digital trapping field for trapping precursor ions and product ions in a trapping region of the ion trap (fig. 3a, 18 and 19).

Ding et al. modifies Zubarev by disclosing switching means between a high and low DC voltage.

Since both Zubarev and Ding et al. teach a 3D quadrupole ion trap, it would be obvious to one of ordinary skill in the art to have the two discrete DC voltage switch between voltage levels to create a digital trapping field of Ding et al. in the method of Zubarev because it would provide a rectangular waveform pattern that can easily be changed intermittently to provide more options for storing and manipulating ions (Ding col. 7, lines 59-67).

In regards to claim 2, Zubarev teaches wherein the initial kinetic energy of the injected electrons is reduced to said kinetic energy suitable for electron induced dissociation to take place after the electrons have entered the ion trap (fig. 3, electrode 24 prevents the entry of electrons into the trapping region, while ions enter the trap. After the trap is filled the electrons are injected and the voltage level is reduced simultaneously. Note: col. 10, lines 14-43 and also col. 4, lines 3-9 and col. 4, lines 24-26which further teach an electron beam with low enough energy to provide electron capture by at least a portion of the trapped ions).

In regards to claims 4 and 21, Zubarev teaches wherein the electrons have a relatively low initial kinetic energy substantially suitable for electron induced dissociation (col. 4, lines 3-9 and col. 4, lines 24-26), and are injected into said trapping region while the trapping voltage is at or close to zero volts (col. 10, lines 28-38, it is interpreted that 1V is close to zero volts).

In regards to claims 14 and 31, Zubarev teaches including applying a pulsed gate voltage to gating means to control extraction of electrons from an electron source for injection into said trapping region (gating electrode 24) and synchronising application of said pulsed gate voltage with the step of switching said trapping voltage to said selected voltage level (as described in col. 10, lines 14-43).

In regards to claims 15-16 and 32, Zubarev differs from the claimed invention by not teaching including applying a broadband dipole signal to the ion trap to remove product from the central region of the ion trap.

Ding teaches including applying a broadband dipole signal to the ion trap to remove product from the central region of the ion trap (col. 2, lines 49-62, note: AC excitation voltage 22).

Ding modifies Zubarev by providing a time-varying dipole excitation voltage to cause mass-selective resonant oscillatory motion of the ions in the trapping region (i.e. an alternating current (broadband dipole signal) applied to electrodes 21 to remove (mass-selection) ions from the trap).

Since both Zubarev and Ding et al. teach a 3D quadrupole ion trap, it would be obvious to one of ordinary skill in the art to have the AC voltage source of Ding in the device of Zubarev in order to further apply an additional dipole excitation voltage.

In regards to claim 17, Zubarev teaches wherein the trapped precursor ions include multiply-charged precursor ions (col. 2, lines 11-14, note: “in the ECD technique positive multiply-charged ions dissociate upon capture of low-energy (<1 eV) electrons in an ion cyclotron resonance cell”), and the injected electrons have a kinetic energy less than 1 eV and are capable of inducing electron capture dissociation of said multiply- charged ions (col. 9, lines 28-33 note: “The potential U.sup.- on the emitting surface 15 of the electrode is chosen such that the electron energy in the center of the cell is below 1 eV. The current of the electrons is selected such as to achieve the trapping of positive ions in the x-direction.” Further note: that this is the same electron source used in the Paul trap).

Claims 5, 19, 21, 22, 26 and 36 rejected under 35 U.S.C. 103(a) as being unpatentable over Zubarev (US patent no. 6,958,472) and further in view of Berkout et al. (US patent no. 6,858,840) and further in view of Ding et al. (US patent no. 7,193,207).

In regards to claims 5, 19, 22, 26 and 36, Zubarev teaches a method/device for dissociating ions in a 3-D quadrupole ion trap (inherent in the apparatus of figure 3) composed of a ring electrode (21) and a pair of end cap electrodes placed across the ring electrode (cap electrodes 22 and 23), comprising the steps of switching a trapping

voltage between two discrete voltage levels to create a digital trapping field for trapping precursor ions and product ions in a trapping region of the ion trap (note; col. 10, lines 32-38, “voltage between the ring electrode 21 and the cap electrodes 22 and 23 is reduced to about 1 to 10 V peak-to-peak. Now the ions are confined in the center of the cell, partially by the electron beam and partially by the alternating voltage, though mostly by the electron beam”, since the oscillating voltage is reduced, it was originally set to a higher discrete voltage and by reducing the voltage peak to peak, the voltage is switched to a second discrete voltage), and injecting electrons through a hole in one of the end cap (fig. 3, note: hole in cap electrode 22 for introducing electrons from the electron source) electrodes into said ion trap while the trapping voltage is at a selected one of said two discrete voltage levels (col. 10, lines 28-38 teach that the electrons are introduced into the trap simultaneously with the voltage reduction) whereby injected electrons reach the trapping region with a kinetic energy suitable for electron induced dissociation to take place (col. 10, lines 14-43 teach the fragmentation, confining ions to the center of the trap with electron capture and col. 4, lines 3-9 and col. 4, lines 24-26 teach an electron beam with low enough energy to provide electron capture by at least a portion of the trapped ions) (regarding introduction of the electron beam through a hole in the ring electrode of claims 26 and 36, although it is not expressly taught by Zubarev, such an arrangement (well known to the art) is merely rearrangement of parts and the substitution of one known element for another would have yielded predictable results).

Zubarev differs from the claimed invention by not disclosing the three discrete voltage levels.

Berkout et al. teach applying three discrete voltage levels (Fig. 4B-2, note: col. 7, lines 23-29).

Since both Zubarev and Berkout et al. teach applying voltages to the electrodes in an ion trap, it would be obvious to one of ordinary skill in the art to have the rectangular waveform Berkout in the device of Zubarev because injecting electrons into a field-free trapping volume allows for the use of a more intense electron beam for electron capture dissociation.

The combined invention of Zubarev and Berkout further differs from the claimed invention by not disclosing voltage levels to be DC voltages.

Ding et al. teach switching a trapping voltage between two discrete DC voltage levels to create a digital trapping field for trapping precursor ions and product ions in a trapping region of the ion trap (fig. 3a, 18 and 19).

Ding et al. modifies Zubarev and Berkout by disclosing switching means between a high and low DC voltage.

Since both the combined invention of Zubarev and Berkout and Ding et al. teach a quadrupole ion trap, it would be obvious to one of ordinary skill in the art to have the discrete DC voltage switch between voltage levels to create a digital trapping field of Ding et al. in the method of combined invention of Zubarev and Berkout because it would provide a rectangular waveform pattern that can easily be changed intermittently to provide more options for storing and manipulating ions (Ding col. 7, lines 59-67).

In regards to claim 21, Zubarev teaches wherein the electrons have a relatively low initial kinetic energy substantially suitable for electron induced dissociation (col. 4, lines 3-9 and col. 4, lines 24-26), and are injected into said trapping region while the trapping voltage is at or close to zero volts (col. 10, lines 28-38, it is interpreted that 1V is close to zero volts).

Claims 6-7 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zubarev (US patent no. 6,958,472) and further in view of Ding et al. (US patent no. 7,193,207) and further in view of Zubarev et al. (US patent no. 6,800,851) (herein Zubarev2).

In regards to claims 6-7, the combined invention of Zubarev and Ding et al. differ from the claimed invention by not disclosing including using a magnetic field to guide injected electrons to the trapping region, wherein said magnetic field is generated using an electrical coil arranged to be energised by a pulsed current.

Zubarev2 teaches including using a magnetic field to guide injected electrons to the trapping region (abstract, note: “The invention consists of the application of a magnetic field essentially parallel to the axis of the radiofrequency field to confine the electrons in the direction perpendicular to the magnetic field.”), wherein said magnetic field is generated using an electrical coil arranged to be energised by a pulsed current (col. 7, lines 1-12).

Zubarev2 modifies the combined invention by teaching magnetic coils around the electrode/electrodes such that the electrons are confined to the center of the trapping region.

Since both the combined invention and Zubarev2 teach ion traps, it would be obvious to one of ordinary skill in the art to have the magnetic coils of Zubarev2 in the ion trap of the combined invention because since the magnetic field prevents radial acceleration of the electrons, the electrons essentially retain their initial kinetic energy during a significant part of the trapping period (col. 3, lines 37-42 of Zubarev2).

In regards to claim 18, the combined invention differs from the claimed invention by not disclosing wherein the trapped precursor ions include multiply-charged precursor ions and including the step of introducing a gas into the trapping region of the ion trap whereby the injected electrons are captured by molecules of the gas and electrons are then transferred to the precursor ions to cause the dissociation

Zubarev2 teaches wherein the trapped precursor ions include multiply-charged precursor ions and including the step of introducing a gas into the trapping region of the ion trap whereby the injected electrons are captured by molecules of the gas and electrons are then transferred to the precursor ions to cause the dissociation (col. 5, lines 11-15).

Zubarev2 modifies the combined invention by teaching introducing a buffer gas.

Since both the combined invention and Zubarev2 teach ion traps, it would be obvious to one of ordinary skill in the art to have the gas of Zubarev2 in the ion trap of

the combined invention because it would provide for damping the motion of electrons and ions within a spatially limited region.

Claims 12-13 and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zubarev (US patent no. 6,958,472) and further in view of Ding et al. (US patent no. 7,193,207) and further in view of Reinhold (USPN 6,483,109).

In regards to claims 12-13, the combined invention of Zubarev and Ding et al. differ from the claimed invention by not disclosing introducing pulses of gas into the trapping region of the ion trap to cause collisional cooling of ions prior to or after dissociation, wherein said pulses of gas are introduced into the trapping region using a pulsed valve and a vacuum pump capable of rapidly reducing the gas pressure to below 10-4mbar.

Reinhold teaches introducing pulses of gas into the trapping region of the ion trap to cause collisional cooling of ions prior to or after dissociation, wherein said pulses of gas are introduced into the trapping region using a pulsed valve and a vacuum pump capable of rapidly reducing the gas pressure to below 10-4mbar (col. 13, lines 39-49).

Reinhold modifies the combined invention by providing a pulsed gas valve for collisional cooling of the ions.

Since both the combined invention and Reinhold teach a ion trap, it would be obvious to have the pulsed gas source of Reinhold in the method of the combined invention because it would ensure desired initial conditions of the beam at the time fragmentation.

Claims 29 and 30 are the device claims for the method stated above and therefore are rejected on the same basis as cited above.

Claims 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zubarev (US patent no. 6,958,472) and further in view of Berkout et al. (US patent no. 6,858,840) and further in view of Ding et al. (US patent no. 7,193,207) and further in view of Zubarev et al. (US patent no. 6,800,851) (herein Zubarev2).

In regards to claims 23-24, the combined invention differs from the claimed invention by not disclosing including using a magnetic field to guide injected electrons to the trapping region, wherein said magnetic field is generated using an electrical coil arranged to be energised by a pulsed current.

Zubarev2 teaches including using a magnetic field to guide injected electrons to the trapping region (abstract, note: “The invention consists of the application of a magnetic field essentially parallel to the axis of the radiofrequency field to confine the electrons in the direction perpendicular to the magnetic field.”), wherein said magnetic field is generated using an electrical coil arranged to be energised by a pulsed current (col. 7, lines 1-12).

Zubarev2 modifies the combined invention by teaching magnetic coils around the electrode/electrodes such that the electrons are confined to the center of the trapping region.

Since both the combined invention and Zubarev2 teach ion traps, it would be obvious to one of ordinary skill in the art to have the magnetic coils of Zubarev2 in the

ion trap of the combined invention because since the magnetic field prevents radial acceleration of the electrons, the electrons essentially retain their initial kinetic energy during a significant part of the trapping period (col. 3, lines 37-42 of Zubarev2).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Pertinent prior art is closely related art that individually or in combination could be considered grounds for rejection. See references cited for a listing of the pertinent prior art found and the prior art found.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J. Logie whose telephone number is 571-270-1616. The examiner can normally be reached on 7:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on 571-272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. L./
Examiner, Art Unit 2881
/ROBERT KIM/

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